

APPENDIX D
INVESTIGATION AND ANALYSES REPORT
Whitewater River Watershed Project

BIODIVERSITY/ENDANGERED SPECIES/FISHERIES/WILDLIFE

Procedures/Techniques. Initially, a Tri-Agency Biology Team was formed representing an agency biologist from the USDA Natural Resources Conservation Service (NRCS); the USDI-Fish and Wildlife Service (FWS); and the State Minnesota DNR (MN-DNR). As the project evolved, additional MN-DNR biologists representing Nongame, Fisheries, and Wildlife, and the County Biological Survey for Natural Communities and Rare Species became involved. FWS Biologists from Watershed, Ecological Services, and Refuges became involved. The Winona State University Biology Department sampled stream reaches to determine indices of biological integrity. Each of these agencies and disciplines prepared technical reports which were presented to a Technical Advisory Committee (TAC) and Citizen Advisory Committee during project planning.

Assumptions. Since no large structural flood control measures were included in the recommended plan, a formal Habitat Evaluation Procedure (HEP) was not needed to evaluate the impacts and to determine the possible mitigation of such structural sites.

Scope and Intensity. An Environmental Assessment supported a finding of no significant impact (FONSI). The potential for land management to improve priority stream reaches (Figure 1) established four rating potentials (high, moderately high, moderate, and low) from 50 subunit evaluations. Offsite impacts of sedimentation to stream water quality and trout fishery were evaluated.

CULTURAL RESOURCES

Procedures and Techniques. Coordinated with Minnesota State Historic Preservation Office (SHPO). Reviewed all SHPO historical files for Olmsted, Wabasha, and Winona Counties. Reviewed all SHPO archaeological files for Olmsted, Wabasha, and Winona Counties. Reviewed the Minnesota National Register of Historic Places.

Assumptions. Stipulation IV of the National Agreement and NRCS General Manual (GM) 420 Part 401.33 require NRCS and the SHPO to develop a State Level Agreement (SLA) in order to further expedite the compliance process, speed delivery of conservation, and protect cultural resources.

Scope and Intensity. Individual project measures will be evaluated on a case by case basis before implementation. The evaluation criteria will categorize the individual conservation practices as either an undertaking with a high probability of impacting cultural resources, or as a non-undertaking with no potential to impact cultural resources. This classification follows the recent SLA with the Minnesota SHPO which requires immediate SHPO review of the area of potential effect of only those NRCS conservation practices categorized as undertakings.

ECONOMICS

Procedures and Techniques.

1. Incremental Analyses
2. Crop Budgets (CARE Program)
3. Interviews
4. Output from AGNPS
5. Output from EPIC
6. "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies"
7. Current normalized prices for agricultural commodities
8. Discount Rate $7 \frac{3}{8}$ percent

Assumptions. Onsite benefits will accrue to this project as a result of installing conservation land treatment practices that will protect the land resource from erosion. As a result of reducing erosion on the uplands, the resources in the flood plain, rivers and streams will be protected and enhanced. This will create more recreational opportunities in the watershed.

Scope and Intensity. Benefits in this plan were computed for onsite and offsite. However, plan formulation was based on offsite benefits only.

Onsite benefits were computed for:

1. Soil productivity loss (sheet, rill, and ephemeral gully erosion).
2. Value of nitrogen and phosphorus loss due to erosion.
3. Crop growth damages.
4. Difference in variable production cost.

Offsite benefits were computer for:

1. Reduced recreational impairments.
2. Reduced sedimentation to roads, ditches, rivers and streams.

ENGINEERING/HYDROLOGY

Procedures and Techniques.

1. Used NRCS Practice Standard 362 for Diversions.
2. Used NRCS Practice Standard 410 for Grade Stabilization Structures.
3. Used NRCS Practice Standard 412 for Grassed Waterways.
4. Used NRCS Practice Standard 580 for Streambank Protection.
5. Used NRCS Practice Standard 584 for Stream Channel Stabilization.
6. Used NRCS Practice Standard 600 for Terraces.
7. Used NRCS Practice Standard 312 for Waste Management Systems.
8. Used NRCS Practice Standard 633 for Waste Utilization.
9. Used NRCS Practice Standard 638 for Water and Sediment Control Basins.
10. NRCS Technical Release 20 (TR-20) Hydrologic Model used for watershed analysis.
11. Stream gage analysis
12. Resurveyed Stafford Happ's 94 historic sedimentation ranges. Used average end area method to determine flood plain deposition between surveys.
13. Sediment Budget concept as presented by Stanley Trimble, UCLA Geography Department.

Scope and Intensity.

1. Used TR-20 to look at hydrologic impacts of land management practices at three different scales: point scale, field scale, and watershed scale.
2. Flood plain deposition estimates were based on the resurvey of 44 of the 94 historical cross sections. Estimated deposition between surveys and projected averages to predict a present day sediment deposition rate.
3. Used floodplain deposition calculated as noted above as a known value in sediment budget.

FEEDLOTS

Procedures/Techniques.

1. AGNPS was used to assess the pollution potential of feedlots.
2. A total of 433 feedlots were inventoried including interviews with the landowner/operator by a SWCD employee. Of these 364 were included in the AGNPS feedlot analysis.

Assumptions. AGNPS is an acceptable approach to assess feedlots and to determine the most cost effective treatment.

Scope and Intensity.

1. A detailed map was drawn to scale for each feedlot to assist developing the parameter values.
2. Feedlot buffer lengths for those originally estimated over 300 feet were adjusted to a distance no greater than 300 feet.

Feedlots were ranked based on the mass of chemical oxygen demand in the feedlot runoff.

FORESTRY

Procedures and Techniques. Area of forest land cover, forest type group, stand size class, stocking class, and tree grade are the primary forest resource information categories collected in the Whitewater River Watershed. Total forest land cover was determined by the MN Land Management Information Center. Revised forestry land use acreages were developed by the NRCS. Once the forest cover acres were determined, Forestry Inventory and Analysis (FIA) plot data was used to determine the area in other categories.

Forest Inventory and Analysis data is a statistical inventory based on randomly sampled plots. All the plots within the Whitewater River Watershed were used to develop a standard set of FIA tables. Because the number of plots are small, the estimate of acres in various categories are not accurate. Therefore, the actual values calculated from the plots in the watershed were not used, but percentages were used to allocate total forested acres into various categories. These categories were then checked against regional report statistics to be sure the data from the watershed followed the same trend as the region.

Logging roads, skid trails, landings, and stream crossings are the major sources of forest land erosion. The Minnesota Department of Natural Resources, Division of Forestry, has identified Best Management Practices (BMPs) for timber harvesting in Minnesota. The conducted audits of timber harvesting operations were for the years 1991-93. The audits evaluated the application and effectiveness of BMPs in preventing water quality problems. The results of these audits were used to determine potential impacts of timber harvesting on water quality in the Whitewater River.

Assumptions. It was assumed that the Whitewater River Watershed forest resource statistics were similar to the forest statistics in Olmsted, Wabasha and Winona Counties.

It was assumed that application and effectiveness of forest management BMPs in the Whitewater River Watershed are similar to the application and effectiveness of BMPs in Southeastern Minnesota.

It was assumed that the combination of conservation practices on cropland and establishment and management of forest resources would improve watershed conditions today as similar combination of practices improved watershed conditions in the 1930's through the 1950's.

Scope and Intensity. Forestry practices in the watershed plan focus on the protection of existing forest resources and the expansion of forest land into areas that would improve the watershed conditions. The forest resource provides income to landowners, wood products for area businesses, wildlife and fish habitat to enhance quality of life in the watershed and recreational opportunities, and enhance crop and livestock production for farmers. Trees planted in riparian zones filter water before it enters a

stream. Trees planted on steep slopes and other areas reduce surface runoff and increase infiltration. The scope of the forestry portion of the plan focuses on practices that help landowners maximize these opportunities on their land, and also improve the conditions of the watershed.

GEOLOGY AND SEDIMENTATION

Procedures and Techniques.

1. AGNPS computer model used to determine sheet and rill erosion. Ephemeral and classic gully erosion were input parameters to the AGNPS model.
2. Procedures for streambank surveys developed with MPCA and Winona State University (WSU) for student intern projects.
3. Used Lan Tornes' USGS report that expanded suspended sediment records at Beaver and North Fork stations.
4. Bedload sediments estimated based on a James C. Knox study of the Big Platte River in Wisconsin.
5. Sediment Budget concept was used as presented in papers and programs by Stanley Trimble of the UCLA Geography Department.
6. Floodplain deposition was estimated from Stafford Happ's 45 cross sectional surveys in 1939; 94 in 1964-1965 and 94 resurveyed in 1993-1995. Used an average end area method to determine quantity of flood plain deposition.

Assumptions.

1. Of the streambank erosion, it was estimated that 20% redeposited near the erosion site while 80% moved downstream.
2. Five streambank erosion severity categories were determined and ranged from 100 tons/bank mile (slight) to 700 tons/bank mile (severe). If there was erosion on both banks, erosion amounts were increased by 25% (Lower Whitewater - 40%). For erosion on both banks in tributary streams, erosion amounts were increased by 25% (Trout Creek - 35%).
3. The Corps of Engineers (COE) Weaver Bottoms Rehabilitation Project in 1992 determined that 27,000 cubic yards of sediment are deposited in the Whitewater River delta annually.
4. Assumed a weight of 55 pounds per cubic foot for the 27,000 cubic yards of sediment that the COE determined is being deposited in the Whitewater River delta annually converts to 20,048 tons per year.
5. Sediment Delivery Ratio (SDR) for ephemeral and classic gully erosion was estimated to be 25% based on communications with Lyle Stephen, NRCS Regional Sedimentation Geologist. SDR for sheet and rill erosion was estimated to be 8% based on a Coon Creek Watershed, Wisconsin, study by Stanley Trimble where he found the SDR in Coon Creek to be 7.8%.
6. The floodplain deposition volume calculated from Dr. Stafford Happ's cross sections was converted to tons using 70 pounds per cubic foot as a conversion factor.

Scope and Intensity.

1. AGNPS input data determined by field investigations, published data and judgmental values.

2. AGNPS parameter values were by 40 acre cell.
3. Streambank erosion surveys by two WSU students were supplemented by additional streambank surveys by NRCS geologists to cover 64% of the main channels.
4. Floodplain deposition estimates were based on the resurvey of 44 of the 94 historical cross sections with projections made for the remaining cross sections.
5. Using the computed floodplain deposition for 2 time periods of 25-30 years a projected deposition value was obtained for the present. The sediment deposited in the Whitewater delta was treated as a known value. Other values were predicted through field surveys and through the use of models and other data.

LAND USE

Procedures and Techniques. Land use/cover acreages for the four subwatersheds, plus Beaver Creek and the total were provided by the Minnesota Land Management Information Center (LMIC). The 16 categories were summarized into eight.

Assumptions. The LMIC categories were assumed to be land cover values only. Revised land use values were developed for each land cover category. Sixteen different land uses were established.

Scope and Intensity. LMIC data, field investigation, published data, planimeter work, and judgmental views.

1. Fish and Wildlife Service National Wetland Inventory acreage was used.
2. MN-DNR acreage values were used for the WMA parks and Memorial Hardwood Forest.
3. Urban areas were planimetered on photos.
4. Stream lengths as determined in the streambank erosion study were used. Average widths were based on the Happ Surveys.
5. Roads and railroads were measured on photos.
6. See Land Use Report in the Support file for more details.

SOCIAL PROFILE

Procedures and Techniques. Data in this report was retrieved from:

1. The 1990 Census of Population and Housing - Summary, Social Economic, and Housing Characteristic - Minnesota.
2. Minnesota Land Management Information Center - DATANET 1995.
3. Outdoor Recreation survey of Whitewater Wildlife Management Area - MN-DNR.

Assumptions.

Scope and Intensity. A social profile was developed to describe the objective and subjective social characteristics of the population in the Whitewater River Watershed. These characteristics were compared to the characteristics of residents in other areas. For this report, residents in the watershed were compared to residents in Olmsted, Wabasha, and Winona Counties and the State of Minnesota. No attempts were made to make judgments about positive or negative social effects.

SOIL EROSION

Procedures and Techniques. AGNPS was used to determine gross erosion.

Field survey of streambank erosion by an interdisciplinary team.

Assumptions.

1. Type II Rainfall distribution applies for soil erosion calculations (EI values).
2. Composite conditions for each 40 acre AGNPS cell adequately reflects watershed conditions. Implementation will be for the most part by fields not 40 acre tracts. However, this should not be a problem in assessing the total watershed.

Scope and Intensity.

1. Extent of soil productivity damage using EPIC model.
2. AGNPS input by field investigations, published data and judgmental values. Ephemeral and classic gully erosion quantities were estimated and included in AGNPS.

AGNPS

1. Version 3.655 November 1992 was used.
2. Rainfall and Energy Intensity parameter values were used which approximate erosion rate using USLE. It is recognized that AGNPS is a single event model.
3. Adjustments of AGNPS data were made to better reflect the actual land use.
4. Several parameter values were changed for “with project conditions.”

WATER QUALITY

Procedures and Techniques. Water quality is the physical, chemical, and biological components of the water environment. For the Whitewater River Watershed, both surface water and ground water aspects were investigated. The basic techniques used to assess and understand water quality were to gather data and information from existing sources, and supplement with new data collected within the watershed. Sources of existing and new data included:

1. MN -DNR stream surveys (fisheries, stream habitat, stream widths, etc.)
2. USGS Survey flow and sediment data
3. Winona State University stream habitat assessments and benthic macroinvertebrate data
4. MDA flow and pesticide data
5. Olmsted County Public Health Service's private well water tests for nitrate
6. USDA NRCS hydrology and infiltration studies
7. MPCA water chemistry and bacteria sampling

These data sources, representing multiple sets of water quality variables, were assessed by individuals with input from a project technical committee.

Assumptions.

1. Both surface and ground water quality must be considered together as part of a comprehensive "package."
2. Defining specific numerical changes is difficult without the careful use of quality data sets and predictive models. Therefore, predicted changes in water quality as a result of the project are generalized as trends.
3. Year-to-year variability and climatic conditions are key factors in water quality.

Scope and Intensity.

The scope and intensity of water quality assessment techniques has been variable over the recent past, as well as the past 30-40 years. This effort has taught us to better coordinate data collection efforts, and attempt to link land use and land management actions with water quality. A more consistent process will be followed during project implementation and post-project monitoring/evaluation.